SECTION 8 - PROJECT COSTS AND ECONOMIC JUSTIFICATION

PROJECT COSTS

Construction expenditures by year in 2000 dollars are displayed in table 8 - 1 along with the interest during construction estimates for each with-project alternative and the gated structure. Two additional with-project alternatives are included in table 8 – 1 that shows the possibility of a shorter construction schedule to build the earthen chamber alternatives although at a higher cost. This is due to the fact that wick drains will have to be used to reduce the construction time. As is shown in table 8 – 1, total costs for lock construction alternatives range from $68.4 million for the 1200 x 75 x 15 foot concrete chamber alternative to $88.2 million for the 1200 x 110 x 15 foot earthen chamber with drains alternative. The earthen chamber plans without wick drains have a 5.5 year implementation period and a 3.5 year implementation period for the earthen chamber plans with wick drains, whereas the concrete chamber plans and the gated structure plan have a 3 year schedule. It should also be noted that the with-project construction expenditures displayed in table 8 – 1 also include approximately 3.3 million dollars in bank stabilization work and the placement of mooring buoys near the improved lock.

In addition to the construction costs described above, total project costs also include Engineering and Design costs, Operations, Maintenance and Replacement costs, Construction Management costs, Real Estate costs and Mitigation costs.

Table 8 - 2 displays the composition of the total project costs, in terms of average annual equivalents, for the in-kind replacement structure plan (without-project condition) and each with-project alternative. All annual costs were calculated using an interest rate of 5.875 percent and a 50 - year project life. Table 8 – 2 also displays the total average annual costs for each of the lock alternatives, which is simply the sum of all the cost items listed, and the total incremental average annual costs for each of the with-project lock alternatives. As was discussed in section 6 of this appendix, because of the increase in the project flood flow line, an in-kind replacement lock is required in the near term, therefore the NED cost of adding capacity at Bayou Sorrel is the difference between the costs of the new larger lock and the cost of the in-kind replacement structure. Due to the fact that the in-kind replacement structure has a different base year (mid 2010) than the concrete chamber alternatives (2008) and the earthen chamber alternatives with wick drains (mid 2008), the total average annual costs of the in-kind replacement structure was adjusted to reflect a common point in time with these alternatives in order to correctly estimate the incremental total average annual costs. Using the current interest rate of 5.875 this was accomplished by multiplying the total average annual cost estimate of the in-kind replacement structure by (1+.05875)^-2.0 to reflect a mid 2008 point in time and by (1+.05875)^-2.5 to reflect a 2008 point in time.

BENEFIT PRICE LEVEL UPDATING

Price level updating was employed in order to represent navigational benefits in the same 2000 dollars used for project costs. As indicated in previous sections of this appendix, benefits were initially computed in 1997 prices. The following details the updating procedure used in this analysis.

Table 8 - 1

Construction Expenditures By Year
(2000 Prices, 5.875 Percent)

Year	In-Kind Replacement	1200 x 75 x 15 Earth	1200 x 75 x 15 Earth w Drains	1200 x 75 x 15 Concrete	1200 x 110 x 15 Earth	1200 x 110 x 15 Earth w Drains	1200 x 110 x 15 Concrete
2005	4,399,813	5,410,063	20,360,745	9,761,585	5,902,563	21,211,954	10,809,939
2006			44,793,640	32,538,617		46,666,299	36,033,130
2007			12,216,447	26,085,470		12,727,172	28,531,629
2008	17,739,510	20,058,004	7,380,587		20,970,479	7,550,829	
2009	32,522,435	36,773,007			38,445,878		
Mid 2010	8,869,755	13,337,440			13,793,678		
Total	63,531,513	75,578,514	84,751,419	68,385,672	79,112,598	88,156,254	75,374,698
Interest During Construction	7,508,954	8,746,686	12,680,955	5,162,024	9,231,116	13,207,094	5,706,116

Table 8 - 2

Average Annual Cost Summary
(2000 Prices, 5.875 Percent)

Lock Alternative	Base Year	Construction Costs With E&D	O&M Costs	Construction Management Costs	Mitigation Costs	Real Estate Costs	Total Average Annual Costs	Incremental Total Average Annual Costs
In-Kind Replacement	Mid 2010	5,002,665	1,516,594	309,058	7,152	8,448	6,843,918	
	Mid 2008						6,105,454	
	2008						5,933,640	
1200 x 75 x 15 Earthen	Mid 2010	5,939,679	1,625,215	374,432	7,152	8,448	7,954,926	1,111,008
1200 x 75 x 15 Earthen w Wick Drain	Mid 2008	6,757,035	1,625,215	432,518	7,152	7,537	8,829,457	2,724,003
1200 x 75 x 15 Concrete	2008	5,105,570	1,462,137	328,290	7,152	7,118	6,910,267	976,627
1200 x 110 x 15 Earthen	Mid 2010	6,222,124	1,476,899	392,857	7,152	8,448	8,107,481	1,263,563
1200 x 110 x 15 Earthen w Wick Drain	Mid 2008	7,029,535	1,476,899	449,672	7,152	7,537	8,970,796	2,865,342
1200 x 110 x 15 Concrete	2008	5,628,391	1,410,689	361,163	7,152	7,118	7,414,513	1,480,873

Table 8 – 3

IWR Shallow-Draft Vessel Operating Costs

(Total Hourly Cost)

Towboat Operating Cost

	Horsepower										
	1200	1400 - 1600	1800 - 2000	2200 - 2400	2800 - 3400	4000 - 4400	5000 - 6000	6100 - 7000	7100 - 8000	8100 - 9000	10,000
FY 1997, Int=7.375%	107.00	127.01	153.55	180.19	215.43	258.87	305.63	397.70	449.94	501.10	587.19
FY 2000, Int=6.625%	119.63	137.12	159.03	179.80	218.99	269.53	326.10	404.02	457.09	510.53	588.77
% Change	11.8%	8.0%	3.6%	-0.2%	1.7%	4.1%	6.7%	1.6%	1.6%	1.9%	0.3%

Barge Operating Cost

	Barge Type										
	Deck	Deck	Open Hopper	Open Hopper	Covered Hopper	Tank db skin without coils	Tank db skin without coils	Tank db skin without coils	Tank db skin with coils	Tank db skin with coils	Tank db skin with coils
	130x35	195x35	175x26	195x35	195x35	195x35	240x50	290x50	195x35	240x50	290x50
FY 1997, Int=7.375%	2.30	3.97	2.48	4.46	4.92	11.60	19.79	22.20	12.12	19.79	23.32
FY 2000, Int=6.625%	2.20	3.70	2.49	4.04	4.40	11.35	18.37	21.61	11.84	19.24	22.65
% Change	-4.3%	-6.8%	0.4%	-9.4%	-10.6%	-2.2%	-7.2%	-2.7%	-2.3%	-2.8%	-2.9%

IWR shallow – draft vessel operating costs were used as the basis for updating the price level of the navigation benefits. As a first step, FY 97 and FY 00 IWR costs for individual towboat sizes and barge types were compared, and the percent change for each piece of equipment was calculated. These results are displayed in table 8 – 3. In order to convert these ranges of values to a single value that could be used as an index value to be applied to navigation benefits, a typical tow was constructed for each of the major commodity groups. Using the cost of each typical tow, a weighted average tow cost for each year, FY 97 and FY 00, was calculated using tons of each commodity as the weighting factor. The calculated index factor turned out to be essentially 1.0 representing no change in the price level over the three-year period from 1997 to 2000.

SUMMARY OF BENEFITS

Representing a National Economic Development (NED) benefit, and included in total project benefits, are benefits due to accidents avoided attributable to the wider widths of the improved lock alternatives. Marine accident reports from New Orleans district's Operations Division were analyzed from 1990 to the present for various locks on the IWW system. At the existing Bayou Sorrel lock it has been determined that approximately 8 accidents occur per year. At Calcasieu lock, which is 1200 ft x 75 ft and at Leland Bowman lock, which is 1200 ft x 110 ft it has been determined that at both locations, where traffic levels are essentially the same, approximately 4 accidents occur per year at Calcasieu lock and approximately 2 accidents occur per year at Leland Bowman. However, at the Bayou Sorrel site where traffic levels are essentially half of what is transiting through Calcasieu and Leland Bowman locks and where locking conditions are more favorable than at Calcasieu lock, it was determined that the difference between the number of accidents between a 75 ft wide lock and a 110 ft wide lock would be insignificant. In addition, information obtained from the towing industry as well as from the New Orleans district's marine accident reports revealed that the cost per accident at the lock and for the tow was approximately $12,500 and $10,000 respectively. Consequently, these estimates were used in determining this benefit category.

An additional benefit to the towing industry is the avoided cost of hiring assist vessels whenever the tow has to cut itself in order to traverse the lock. Once again this is a function of the width of the lock. The narrower the chamber, the more likely a tow would have to break apart in order to traverse the lock. LPMS data on various locks on the IWW system from the Corps of Engineer's Navigation Data Center provided estimates of multiple-cut lockages that are likely to occur in the with and without-project conditions. For the in-kind replacement lock approximately 3200 tows per year are expected to hire assist vessels whereas for the larger with-project lock sizes all tows are expected to traverse the lock without tug assistance. According to local towboat operators, it currently costs approximately $250 per assistance.

All of the above estimates of accidents and assist vessels were then grown over the 50 year project life using the rate of growth in traffic that the GEM produced at Bayou Sorrel lock in order to calculate an average annual estimate.

Table 8 - 4 displays the composition of total average annual benefits for each of the with-project lock alternatives. Both the average annual navigation benefits and the average annual cost savings associated with accidents and assist boats represent the incremental benefits over the in-kind

Table 8 – 4

Average Annual Benefit Summary
(2000 Prices, 5.875 Percent)

Lock Alternative	Base Year	Navigation Benefits	Cost Savings due to Accidents & Assist Boats	Incremental Total Average Annual Benefits
1200 x 75 x 15 Earthen	Mid 2010	14,783,346	1,281,972	16,065,318
1200 x 75 x 15 Earthen w Drain	Mid 2008	14,811,989	1,279,562	16,091,551
1200 x 75 x 15 Concrete	2008	15,023,747	1,275,750	16,299,497
1200 x 110 x 15 Earthen	Mid 2010	15,236,437	1,281,972	16,518,409
1200 x 110 x 15 Earthen w Drain	Mid 2008	15,302,077	1,279,562	16,581,639
1200 x 110 x 15 Concrete	2008	15,291,646	1,275,750	16,567,396

replacement lock in the without-project condition.

ECONOMIC JUSTIFICATION

Table 8 - 5 summarizes the annual costs, annual benefits, net benefits, and benefit – to - cost ratios (BCR) for each alternative. Net benefits represent the difference between total annual benefits and total annual costs. Maximum net benefits define the NED plan.

Because all annual benefits and annual costs reflect the base year (the first year of project operation) of the alternative in question, it is necessary to account for the fact that alternatives have different implementation dates when identifying the alternative that generates the maximum net benefits. To account for this effect of differing base years, the net benefits of each alternative can be shifted forward or backward, using present value techniques, such that all alternatives reflect a common point in time. This adjustment is reflected in table 8 - 5 by using the year 2008 as the common reference point. It should be noted that the selection of a different common reference point does not affect the relative standing of alternatives, only the absolute amount of the net benefits would be affected.

As table 8 – 5 shows net benefits are maximized with the 1200 x 75 x 15 foot concrete chamber alternative ($15.3 million) producing a BCR of 16.7 to 1.

Table 8 - 5

Average Annual Benefit - Cost Summary
Mid Growth Scenario
(2000 Prices, 5.875 Percent)

	1200 x 75 x 15 Earthen	1200 x 75 x 15 Earthen w Drain	1200 x 75 x 15 Concrete	1200 x 110 x 15 Earthen	1200 x 110 x 15 Earthen w Drain	1200 x 110 x 15 Concrete
Total Annual Cost	1,111,008	2,724,003	976,627	1,263,563	2,865,342	1,480,873
Total Annual Benefits	16,065,318	16,091,551	16,299,497	16,518,409	16,581,639	16,567,396
Net Benefits	14,954,310	13,367,548	15,322,870	15,254,846	13,716,297	15,086,523
BCR	14.5	5.9	16.7	13.1	5.8	11.2
Base Year	Mid 2010	Mid 2008	2008	Mid 2010	Mid 2008	2008
Net Benefits Adj. to 2008	12,965,307	12,991,373	15,322,870	13,225,871	13,330,308	15,086,523